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Editor :
T. DALLING, M.A., M.R.C.V.S.

Sub-Editor :
J. McCUNN, M.R.C.V.S., M.R.C.S., L.R.C.P.,
Professor of Anatomy, The Royal Veterinary College.

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EDITORIAL

PREVENTIVE MEDICINE

We refer elsewhere in this number to the sudden death of Dr. W. W. C. Topley, the secretary of the Agricultural Research Council, and we pay tribute to his work for the veterinary profession. Dr. Topley's death raises in our minds once more the whole subject of our relationship to other scientific institutions and the part that we as a profession have to play in the health and control of disease of livestock. The veterinary profession is but a small body of trained workers who have tended to specialise in one direction, viz., the treatment of livestock and small animals actually affected with a disease. It is true that within more recent times our activities have been directed more to the control of disease by the practice of preventive medicine: our future work must lie more and more in that direction. There is an ever-increasing field of importance for the veterinary profession, and we must equip ourselves and our successors for that field—the field of preventive medicine. Three aspects stand out—a knowledge of the normal functions of the animal body; a knowledge of and the cause of abnormalities, i.e., disease; the application of methods of control with a very great bias to the prevention of the abnormal. Our knowledge of some of the normal processes is as yet quite incomplete; until we know more of them we cannot understand efficiently the abnormal. The process by which the various types of knowledge is acquired is termed research: we are all research workers in our own sphere, but to acquire sound, scientific information on the above points, organised research is essential. It is our duty to use any information and data which become available and to see to it that none is wasted or misplaced. By well-planned and conjoint efforts we shall succeed.

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General Articles

AGRICULTURE AND THE VETERINARY PROFESSION

A REVERIE

By CAPTAIN W. G. WRAGG, M.R.C.V.S.

INTERESTING AGRICULTURAL STATISTICS

	England and Wales	*Scotland*
Total Area, Acres	37,132,688	19,069,000
Total Acreage Under Crops and Grass ...	24,643,261	4,571,166

Number of Agricultural Holdings in Great Britain—

Acres 1-5	5-50	50-100	100-150	150-300	*Over* 300	*Total*
77,773	193,977	71,401	37,654	40,914	14,235	435,954

Dairy Cattle, Great Britain ...	5,703,000
Beef Cattle, Great Britain ...	2,204,000
No. of Holdings Selling Milk ...	150,000 (50% have 12 cows or less)
No. of Accredited Herds	25,000

Estimated Value of Agricultural and Horticultural Produce—

	England and Wales	*Scotland*
Livestock and Livestock Products... ...	£154,560,000	£19,330,000
Total, All Products	£219,430,000	£41,345,000

The interests of the veterinary profession are inseparably linked with the welfare of the agricultural industry. Livestock is the mainstay of British agriculture, and its importance is reflected in the annual returns. In the last pre-war year the estimated value of the output of agricultural and horticultural produce was 264 million pounds, out of which livestock and livestock products were valued at 186 million pounds.

It has taken the cataclysm of another world war to disclose the vital importance of agriculture to the national life, but unfortunately a big section of the community is unaware of the conditions of rural life and unable to appreciate why the agricultural industry has suffered so much from political and national negligence. The deplorable state of agriculture prevailing at the outbreak of war was probably more the result of short-sightedness and ignorance than the wilful neglect of the nation. In the busy industrialised life of the day we have been losing the rural habit and out of touch with the countryside, and took it for granted that our daily food would in some way be supplied from a farm at home or overseas.

Now in war it has been necessary to appeal to our farmers. They have done their utmost and will always do so, given just conditions and fair treatment.

Agriculture is a highly technical business. There are unique obstacles to be negotiated and frequent complications and risks involved in its pursuit. It is ignorance of these difficulties and risks on the part of the average elector, who forms the bulk of the electorate to whom special appeal on the subject of agriculture must be made and upon whom the approval for legislation must largely depend. The electors must be thoroughly informed and convinced of the vital necessity of the permanent restoration of agriculture to prosperity just as much as they recognise the necessity for the utmost possible production of the food supplies which the serious national position demands to-day.

In order to appreciate the causes of the position of agriculture at the outbreak of war it is necessary to look back, and beyond the depression experienced after the 1914-18 war, for 60 years or so when agricultural depression set in. It was then attributed to the importation of foreign corn. At that time the price of

meat remained relatively high, but with the rapid development of sea and rail transport abroad the returns for home-grown meat fell to an unremunerative level. This was followed by the competition of Australian and New Zealand mutton and wool, meat and meat products from North and South America, and meat and bacon from Europe. Despite the overseas competition, the British farmer might have met the changed conditions if it had not been for imported wheat, which meant unprofitable arable land at home, much of which gave place to inferior permanent pasture.

The British farmer is often represented as being too conservative and that his overseas *vis-à-vis* is more progressive and resourceful, but the reason is that it is impossible for British farmers, with the vagaries of our climate, to compete with the many overseas more favoured by soil and climate. It is only fair to say that our farming was, and is, technically far ahead of most farming on the Continent, our cropping the most scientific and yields the highest, and in animal husbandry Great Britain holds a pre-eminent position, thanks to very many years of selective breeding.

What of the future? If the country demands that something must be done for agriculture cannot we, as a nation, make this great national movement the opportunity to reach by scientific, thorough and common-sense methods a settlement of all problems connected with the land? The primary essential condition for a settlement is security. A well-organised farm, driven at high pressure and producing a maximum output, is not a matter that can be settled in a year or two. It requires years of patience, expert foresight and highly developed skill and judgment before it arrives at anything approaching perfection, and the necessary capital outlay cannot be expected or justified without something approaching absolute future security. If the farmer feels that he is at any time at the mercy of the House of Commons, progressive agriculture is an impossibility. For the future, even if we admit candidly that we can never approach the state of producing even the major portion of our food in this country, that should not be made the excuse for the neglect of the sources of production that now exist.

During the period of agriculture which we have under review there have been many changes in the employment and outlook of the veterinary surgeon. Formerly equine practice constituted 90 per cent. of our activities. There has been a great and rapid extension of small animal practice and attendance on farm livestock; a limited number have been employed on meat inspection in the cities and a few boroughs. We have seen the establishment of a State Veterinary Service and the inauguration and rapid extension of veterinary research. At this point I wish to emphasise how indebted we are to my revered chief, the late Sir Stewart Stockman, who overcame all difficulties and prejudices and earned recognition and State support for the vital field of research which had been long overdue.

All these changes in our activities have been effectively met, thanks to the adaptability of the profession and to the progressive policy pursued by the Royal College of Veterinary Surgeons with our educational system.

To-day our knowledge of many diseases and the elaboration of many new drugs, vaccines and sera has transformed veterinary medicine from an empirically practised art into a real science based on experiment. Our

XUM

progress has opened out a limitless vista of possibilities of cure and, more important still, of prevention.

We can look back with pride to the eradication of the major plagues of rinderpest, pleuropneumonia, glanders, etc., which formerly ravaged our herds and studs; but we are now faced with problems of disease control and eradication more difficult to solve. I refer to a few only, among many, tuberculosis, brucellosis and mastitis, which have such a wide distribution and are firmly established in a large number of holdings.

Why Are Some Diseases So Prevalent?

Why is it that, despite the pre-eminence we have gained in the livestock industry of the world, there is such a widespread and high incidence of certain diseases when we have knowledge and experience of effective methods of treatment and/or prevention?

(1) Foremost is the neglect of the stockowner to consult his veterinary adviser either in the prevention of disease or until his stock is seriously menaced. Unfortunately, too, some owners are prejudiced and superstitious and still have faith in the magic power of the mystic wand, lingering beliefs in the technical ability of the so-called practical man or quack; and in proprietary remedies purveyed by so many firms and charlatans.

(2) Another factor is that, owing to a state of uncertainty in the agricultural industry and irregular prices, many owners are quite prepared to accept the continuance of wastage from disease and loss of milk rather than face the trouble and expense of securing alleviation or freedom from disease, and yet, in spite of all their efforts, possibly lose money through a slump in stock values. The latter factor has been a frequent occurrence during the last 50 years.

(3) Another factor difficult to assess, despite the progress in research, is the relationship of diet and disease. On many holdings far too little attention is given to the rearing of calves and the care of young stock, with resultant lack of health and vigour in adult age. The importance of adequate nutrition in the process of growth and in the maintenance of health must be emphasised if healthy existence is to be realised. Of all the factors concerned in the maintenance of health, nutrition is probably the most important.

Influence of Extension of Milk Production

The present unsatisfactory disease position has been influenced in large measure by the rapid expansion of milk production, particularly since the Great War, which farmers found more attractive than the raising of beef cattle. Incidentally, this development has been responsible for the breeding of many nondescript types of animals, as attention has been concentrated on milk production, the calves sold, and little or no attention paid to breed or type of bull used in these herds. The latter problem has in part been legislated for by the Licensing of Bulls Act—that it was necessary is an unfortunate reflection on many owners in this land of pre-eminence in stockbreeding.

The change-over to milk production was undertaken by many owners with buildings ill-suited for the purpose, lacking good water supply and adequate equipment. This has been particularly evidenced by the experience of local authorities in the administration of the accredited milk scheme of 1935—a cattle slum clearance is long overdue. Many started their milking herds with cattle

bought in the open market or through dealers, and so began their ventures with the handicap of unhealthy stock. Further, the replenishment of such herds has been equally hazardous, owing to the scarcity of the reserve of healthy stock in the country.

Influence of Legislation and Voluntary Schemes on the Disease Position

Clinical examination of dairy cattle under the accredited milk scheme, the Milk and Dairies Acts and Orders and the complementary Tuberculosis Order.

These measures, introduced primarily for the protection of public health, might have been expected to have exerted some beneficial influence on animal health. There are, of course, no records available from which to estimate the influence of these inspections on diseases and conditions specified in the Acts and Orders, but it would appear that they have had little influence on bovine tuberculosis. The animal statistics show that there is no reduction in the numbers of animals slaughtered under the provisions of the Tuberculosis Order.

It is to be regretted that the work carried out under the M. and D. Acts and Orders has been limited—officially at any rate—to the detection of animals affected with scheduled diseases and conditions, when much might have been done for the improvement of animal health if the veterinary surgeon visited in the role of an adviser rather than as an inspector.

Tuberculosis (Attested Herds) Scheme

The progress of this scheme has been disappointingly slow and the hope expressed that it would lead to the attainment of accredited areas similar to those in the North American Continent is a distant dream.

In this country, as compared with the U.S. and Canada, there are many different circumstances, in addition to the high incidence of disease, which preclude rapid progress. Incidentally, these circumstances also preclude the effective control and eradication of some other diseases, too.

The outstanding difficulty is the size of agricultural holdings in this country. Out of a total number of holdings of 435,000, 75 per cent. are of 100 acres or less, and about 50 per cent. of these are of 50 acres or less. At present, out of a total of more than 150,000 holdings from which milk is sold, only about 25,000 are accredited farms, and it is estimated that about 50 per cent. of the total have 12 cows or less. With many of the small holdings, to ensure effective isolation from neighbouring holdings would entail replanning, and it would be necessary in many cases to readjust boundaries and drainage and even to alter watercourses.

Agricultural Act, 1937, Part IV

When this was introduced it was announced that the Government proposed to initiate a large-scale campaign for the eradication of diseases of animals in Great Britain, but whether owing to the war or political expediency nothing has yet been commenced, although quite recently proposals to improve the quality of the milk supply have been announced.

Survey Scheme

The first report of the operation of this scheme is eagerly awaited and at present it is not possible to assess its value.

XUM

Constructive Proposals to Improve the Relationship Between the Stockowner and the Veterinary Profession

Foremost is education. The scientific and highly technical business of farming requires careful training, and it should include instruction in the basic sciences on which the veterinary art is based.

Education will remove from the minds of men the mask concerning the nature of health and disease and its treatment that superstition, ignorance and prejudice have too long held in place. It is not suggested that animal diseases should figure in the curriculum except to teach so much as may be necessary to enable stockowners to appreciate the general principles of disease control which they have to carry out on their veterinary surgeons' advice. They should be taught that there is no other profession in which accuracy, correct interpretation and application are of greater significance than they are in ours, and they should then appreciate the line of cleavage between knowledge that can be imparted to and used by the layman and that which can be used effectively only with the full complement of facts which are possessed by the properly trained professional man.

Scheme for Provision of Healthy Stock

Unless a large number of owners in the small holdings are to be displaced, as some reformers suggest, to make way for bigger holdings and possibly ranching methods, an urgent problem is the provision of reserves of healthy stock for herd replenishment. The smallholder is often precluded from rearing his own stock from lack of suitable accommodation and a holding inadequate to support it. For a very large number of milk producers the much advocated self-contained herd policy is quite unattainable.

Some Difficulties of the Profession To-day

At our professional gatherings we frequently proclaim what the province of the veterinary surgeon should be in guarding the health of livestock and so play a vital role in the economic life of the nation; but we still have to face the fact that in the counsels of the nation we play all too small a part. We repeatedly learn that Commissions and Committees have been appointed to deal with livestock problems, and invariably we have to press for adequate representation of our profession on them. It can only be described as paradoxical when we reflect that livestock is the mainstay of British agriculture. Further, we see a galaxy of technical advisers, inspectors and others playing the role of advisers on health, and not infrequently on disease, too. While we admit that in the province of animal industry collaboration with experts in the fields of nutrition and genetics is necessary, many of the individuals previously referred to are not so modest and seem to think that the veterinary field is open to everybody and that they have a flair for the veterinary art. Let us see that the profession is not exploited by the politician, the drug firms, or by any other interest.

Publicity

How can we further our claims to fuller recognition by the agricultural industry and by the Government?

It is suggested that the profession should maintain a "publicity," or perhaps a better term might be "liaison," agency. It is true that this has been carried out to some degree by the N.V.M.A., but in the past the efforts have been

XUM

spasmodic, unco-ordinated and usually unrelated. A certain amount has been done for us by the Minister of Agriculture and Fisheries and his department, and recently by firms of druggists.

The first step would be to organise a central body, representative of the profession, to frame a virile policy and to establish and maintain contact with the Parliamentary agricultural groups, with representative agricultural organisations and their regional branches as well as their headquarters. In certain circumstances articles would be prepared for the agricultural and the general Press. A feature could be made of demonstrations on the lines of those given by the N.V.M.A. last year on the request of war agricultural committees.

In setting up such an agency every one of us should feel the responsibility of taking some part freely and gladly, either with framing the policy or in giving effect to it, and so develop an unselfish service to our profession.

What of the Future?

How is the profession to play its full part in a concerted attack on disease which so many members believe to be desirable?

Is it to be by individual effort or to be wholly or in part directed by the State?

The question must be a matter of speculation until the agricultural policy of the Government is announced. There is, however, no doubt but that for some time agriculture must be State-aided, and the claims of the livestock industry, which are vital to arable farming, are paramount.

There are two policies, by either of which a country-wide campaign against diseases of animals could be adopted, either by the State or by individual veterinary surgeons.

If the State accepts the responsibility it might either be directed and staffed by its personnel or it might be left to stockowners, who would receive financial aid to help to meet their expenses, including fees to veterinary surgeons employed by them. Medicine is an inexact science, and the exact methods of the civil service are incompatible, as they do not allow the operation of a scheme which can be administered with the least possible expert knowledge and advice and at the same time show that degree of elasticity necessary to ensure that it does not become automatic and hidebound.

If further State aid is forthcoming it is vital that it must not be a substitution for efficiency. We realise only too well that whatever methods of management and treatment may be prescribed by us, that in many cases they may be of little value unless the stockowner maintains his interest and enthusiasm and fully plays his part, admittedly often difficult and sometimes disappointing.

Conclusion

There are formidable obstacles to be surmounted before we secure proper recognition in the counsels of the nation and the full confidence of the livestock industry, but we must not be overawed by the magnitude of the task.

As we go forward let us remember that the history of the nation shows what is owed to the yeomen of England, who have played so noble a part in war and peace. Agriculture is an industry of historic dignity; let us play our part in helping to preserve its traditions and in our own philosophy include Bacon's words: "Nature is only to be governed by obeying her."

XUM

PURULENT ENCEPHALITIS IN SHEEP: "PSEUDO STURDY"

By W. LYLE-STEWART and ERNEST GRAY,
King's College, Newcastle upon Tyne

A PURULENT encephalitis which frequently occurs in sheep and lambs has been observed in six separate flocks during the last ten years. Both ewes and lambs are susceptible, and the incidence in these flocks has varied from a few up to a dozen or more cases. The condition tends to recur each summer. The symptoms of the disease resemble those of "sturdy" or "gid": that is, there are signs of a brain affection, evinced by drooping of one ear, torticollis and occasionally by blindness. Affected sheep have not been observed to circle as in sturdy, but on the contrary show a marked tendency to walk in a diagonal direction, due presumably to twisting of the neck and the unnatural position of the head. They are hyperexcitable and if disturbed often gallop madly until exhausted, when they beat the air with frantic and unco-ordinated limb movements. At this stage the animal appears to be in a fit, but if left alone soon recovers and joins the other sheep. Body condition is well maintained, and there is no evidence that the disease is accompanied by fever, and if the animal is killed and bled the flesh sets normally and may be salvaged for food. Resolution sometimes takes place, but recovered sheep are generally left with a wry-neck. At one time it was thought that this encephalitis arose as a sequel to dipping, that is, from aspiration of the dipping fluid during the period of complete immersion, for an acute inflammation of the nasal passages is generally present at post-mortem. This seems doubtful, however, since it is stated that lambs may become affected which have never been dipped. One farmer who had suffered losses over a number of years dipped his field flock, in which the disease had been more prevalent, with a new dip, and no cases occurred during the following seasons. His hill flock, however, were dipped in the old dip, and one case of encephalitis occurred. Inquiries have elicited the information that the disease is probably widespread but generally is of low incidence and virulence.

Over a period of four years a series of heads have been examined from sheep which during life exhibited the above symptoms. Pathological and bacteriological examinations have been carried out and the following is a summary of the results obtained:—

Pathological Examination

Case 1.—Lamb four months. The cerebral membranes congested; a large amount of blood-stained cerebral fluid present. Greenish-yellow pus was present on and between the lobes of the cerebellum and in the middle ear. Intense inflammation of the membranes of the nasal cavity, septum nasi, and pharynx extending to Eustachian tubes, by which route infection was thought to have reached the middle ear. Small Gram positive bacilli of diphtheroid type isolated from the pus, but not identified.

Case 2.—Lamb four months. On opening the skull green pus detected at base of brain. The cerebral membranes on the right side engorged and adherent to the bone. Small Gram positive bacilli isolated from the pus. This organism gave a poor growth on hormone agar, Löffler slopes and in Lemco broth, but grew readily in glucose broth and was hæmolytic on blood agar. Its biochemical reactions were as follows: glucose and maltose, acid but no gas; litmus milk,

XUM

alkaline; salicin, dulcite, lactose, not fermented. Saccharose gave an indefinite reaction.

Case 3.—Lamb few months old. Subacute coryza and rhinitis of terminal third of upper nasal passage. Long blood clot at base of medulla, acute phlebitis and thrombosis of spheno-palatine vein. Blood clot around stalk of infundibulum. No meningitis and no otitis media. Yellowish creamy pus present in fourth ventricle and in region of lateral sinus. Bacteriological examination of pus resulted in the isolation of Staphylococcus aureus and albus.

Case 4.—Lamb four months old. The cerebellum presented little pockets filled with sticky green pus. On culture this yielded Staph. albus, a small Gram positive bacillus of diphtheroid type and a Gram negative bacillus. The Gram positive bacillus appeared as small dewdrop colonies on ox blood agar, but growth on other media was extremely slow or negative. The organism formed a tenacious deposit while growing in glucose broth. It was not identified.

Case 5.—Lamb few months old. Intense inflammation of contents of nasal cavity and septum nasi involving the turbinate bones and ethmoid. Blackening and suppurative ostitis of frontal sinus. No meningitis and no abscess formation detected in brain, but sticky green pus was present on and under floor of mid-brain extending from pons to pituitary gland. Cultures from cerebro-spinal fluid, frontal sinus, Eustachian tubes and brain substance proved negative, except for contaminating micro-organisms, chiefly Staph. albus and Cl. sporogenes. From the pus small hæmolytic dewdrop colonies of a small Gram positive beaded micro-organism were isolated on ox blood agar. Growth was not obtained on other media, and on blood agar its appearance was discrete. The organism was very hæmolytic and growth was slow, and after ten days imparted a greenish tinge to the medium.

Cases 6, 7 and 8.—These were all ewes from one farm. The owner stated that he was quite familiar with the disease, which generally affected one or two sheep every summer. This was the first year the disease had assumed serious proportions and twelve ewes became affected. Most of the carcases were salvaged and one affected ewe recovered. The owner did not associate its occurrence with dipping.

Intense inflammation of the nasal passages and contents was present in each head. In two cases (Nos. 6 and 8) considerable sticky green pus was present on the floor of the mid-brain and was noticeable around the foramina through which the cranial nerves take their exit. This may have indicated the channel of entry of the infection. Pockets of green pus were also present in and around the cerebellum of Cases Nos. 6 and 8. No abscess or pus formation was detected in the brain of Case No. 7, and there was no otitis media, although this sheep was stated to have been a typical case. A small Gram positive bacillus of diphtheroid type was isolated from the pus of Cases Nos. 6 and 8. In its morphology and cultural characteristics this micro-organism resembled the bacilli previously isolated from Cases Nos. 4 and 5.

Case 9.—Lamb a few months old from the same farm as Case No. 5. The nasal chambers were diffusely and intensely inflamed, particularly in the distal third. The vessels of the pia mater over the cerebrum and cerebellum were thrombosed, but there was no meningitis. No otitis media detected. Green pus

XUM

was present beneath the cerebellum. Bacteriological examination of the green pus resulted in the isolation in pure culture of a small Gram positive bacillus tending to occur in pairs, and showing morphological and growth characteristics indistinguishable from the micro-organisms isolated from Cases Nos. 4, 5, 6 and 8.

Bacteriology

The organism isolated from the above series of heads resembled one of the diphtheroids, but has not been identified. It was recovered only from the brain lesions and not from swabbings of the inflamed nasal mucosa or from other structures of the head.

Its morphology and cultural characteristics may be briefly summarised as follows: A small delicate non-sporing bacillus of an average length of 1.5μ. pleomorphic, assuming coccoid forms on subcultivation. Gram positive, non-acid fast; when stained by methylene blue showed beading. In smears it tended to occur in loose clusters. It was apparently motile, motility being most marked in young cultures. Growth was only obtained on media containing ox blood; it was ærobic and a facultative anærobe. Deep blood plates became diffusely hæmolysed in 48-72 hours at 37 degrees C. On surface blood plates at 37 degrees C. growth was delicate, slow and discrete: small dew-drop colonies appeared in 48 hours which became marked in 2-5 days by sharp zones of hæmolysis; plates of the freshly isolated organism acquired a greenish tinge. No growth was obtained on ordinary nutrient agar, Dorset's egg medium, MacConkey or glycerine-potato media. Some growth was obtained on serum media, and Löfflers medium tended to be liquefied. Gelatin (12 per cent.) was slowly liquefied over 5-10 days. Nitrates were not reduced, and while acid but no gas was produced in glucose, lactose, maltose and salicin, the reaction to mannite was variable. Dulcite was not fermented. Litmus milk, alkaline, no clot: Methylene blue milk partially reduced, a soft clot formed in 48 hours which underwent digestion. In 1 per cent. glucose broth a filmy tenacious growth formed in 48 hours at the bottom of the tube, the supernatant liquid remaining clear.

Pathogenicity.—This was tested on eleven rabbits inoculated into the ear vein with graduated doses of 48-hour broth cultures. A dose of 6 c.c.s killed an adult rabbit in 16 hours. No macroscopic lesions were detected at post-mortem and the organism was not recovered from the brain, blood or viscera.

The remaining ten rabbits fall into two groups of six and four respectively.

Six rabbits each received one injection of a 48-hour broth culture graduated from 3-5 c.c.s, according to size. Before inoculation a total and percentage white blood cell count was made of each rabbit, the average figures being taken from Murray, Swann and Webb (1926). Further counts were made every 24 hours from the time of injection in order to observe whether a monocytosis occurred.

The effect of the inoculations was to produce a simple fever, as shown by a rise of temperature from 100-105 degrees, an increase in the total white cell count from 8-9,000 - 20-25,000, and a massive increase of the polymorphonuclear leucocytes whose percentage rose from 35-40 per cent. to 60-75 per cent. and even to 80 per cent. A crisis was reached on or about 48 hours after inoculation.

XUM

At this time large numbers of coccoid organisms were observed in blood smears, but attempts to isolate them bacteriologically were unsuccessful. On or about the fourth day after the inoculation the temperature subsided and the normal blood picture was restored.

At no time was any monocytic response observed.

In order to detect whether any latent monocytosis occurred, two rabbits were tested for four and ten days respectively from that day on which the blood picture became normal. It was found, however, that both the total and percentage white cell counts had remained normal.

The remaining four rabbits each received four successive inoculations of 4 c.c.s of a 48-hour broth culture at 4-day intervals.

All the rabbits developed a suppurative phlebitis, characterised by creamy white pus, from which the organism was recovered in pure culture. No clinical symptoms were observed, but at post-mortem three of the rabbits presented a wet catarrhal condition of the nasal mucosa. No macroscopic lesions were observed in the brain, joints or viscera of any of the rabbits and the organism was not recovered elsewhere than from the suppurative phlebitis.

Serological Reactions.—The blood serum of two affected ewes was tested against somatic and flagellar antigens prepared from 48-72 hour broth cultures of the organism with negative results. Attempts to demonstrate agglutinins against similar antigens in the blood sera of the four rabbits receiving four inoculations were also unsuccessful.

Summary

A purulent encephalitis of sheep resulting in a clinical picture resembling that of "sturdy" or "gid" is described. The condition is nearly always associated with an intense mucoid inflammation of the nasal chambers. The typical lesion is the presence of sticky green pus on the floor of the brain stem and in and around the cerebellum. A delicately growing Gram positive micro-organism has been isolated from the green pus. It grows slowly in glucose broth medium, and on solidified serum, and, best of all, on blood agar, which it hæmolyses. The organism has not yet been identified, but work to this end is proceeding. The natural route of infection has not been established, but the train of events may be a coryza or rhinitis followed by infection of the brain stem via the spheno-palatine vein or the main trunks of the trigeminal or facial nerves.

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Murray, E. G. D.; Webb, R. A.; and Swann, M. B. R. (1926): *Journal Path. and Bact.* **29**, 407.

THE ISOLATION OF PASTEURELLA AVISEPTICA FROM A TURKEY

By H. WILLIAMS SMITH and H. I. FIELD,
School of Agriculture, University College of North Wales, Bangor

CARCASES of poultry are commonly received at the laboratory with a history of sudden death. Some are representative of multiple deaths in a flock, while others are isolated deaths. The former type generally present features rendering diagnosis relatively easy, whereas in the latter, although a satisfactory diagnosis can be given in a large proportion of cases, in others no definite conclusion can

XUM

be formed as to the cause of death. The following account of the post-mortem and bacteriological examination of a turkey poult may therefore be of interest.

History.—The carcase was received at the laboratory with an intimation that the poult was apparently normal on being shut up with seven others at night but was found dead beneath the perch in the morning.

After the examination had been completed, a visit to the farm elicited the following information. All poultry were on free range and consisted of eight young turkeys, 60 ducks, 20 hens and 40 five-month-old pullets. The latter were introduced on to the farm from an accredited breeder two months previously. No losses from disease had ever been experienced on this small farm and the neighbourhood appears to be particularly healthy for poultry. This may be attributed in part to the fact that it is a general practice to keep the poultry on free range. Turkeys were introduced on to the farm for the first time three years ago, and all the existing stock were bred on the farm.

Post-mortem examination.—The general condition of the bird was excellent. Some patchy discoloration of the pectoral muscles was noted. The condition of the internal organs was as follows :—

Respiratory tract.—Some slight congestion of the lungs.

Alimentary tract.—The crop and gizzard were filled with corn. The duodenum showed acute hæmorrhagic inflammation. The remainder of the bowel appeared normal.

Liver.—This organ was dotted with small hæmorrhagic foci extending throughout its substance.

Spleen.—Enlarged and soft in consistency.

Heart.—There was no pericarditis. Petechial hæmorrhages were present on the epicardium in the region of the coronary groove and left ventricle. A few petechial endocardial hæmorrhages were also noted.

Blood.—Appeared pink in colour, suggestive of hæmolysis or H.C.N. poisoning.

Examination of smears.—A wet smear prepared from the duodenal contents proved negative for motile protozoans. A blood smear stained by Leishman showed bacillary and cocco-bacillary organisms with distinct bi-polar staining. The majority of the red blood cells showed an extruded nucleus, the cells apparently being hæmolysed.

Culture.—An emulsion of bone marrow in normal saline was plated on to blood agar, solid serum and nutrient agar. All showed good growths after overnight incubation. Colonies were pin-point to pin-head in size, circumscribed, convex and moist. Slight hæmolysis was present at this stage. The plates became completely hæmolysed after standing at room temperature for a further three days.

Smears from isolated colonies were made and stained by Gram and methylene blue. The organisms were Gram negative cocco-bacilli. With methylene blue stain the majority of the organisms stained uniformally, but a number showed bi-polar staining.

Biochemical reactions.—Acid but no gas was formed in mannite, glucose and saccharose. Salicin, lactose and maltose were not fermented. Indole was formed in 1 per cent. peptone water after incubation for five days and sodium

XUM

hippurate was hydrolysed. No change occurred in litmus milk. The organism gave a slight but uniform turbidity in 1 per cent. glucose broth after 24 hours' incubation.

Motility.—No motility was demonstrable after 24 hours' growth in liquid medium, at 37 degrees C.

Filterable hæmolysin.—A filtrate from a 24-hour growth in 1 per cent. glucose broth was tested for hæmolysin using a 5 per cent. suspension of washed sheep's red blood cells in normal saline. A negative result was obtained.

Exotoxin.—0.3 c.c. of a filtrate prepared in the same manner was injected intravenously into a mouse and proved non-pathogenic. (A similar amount of the culture proved fatal intravenously in a mouse within 18 hours.)

Pathogenicity Tests

Mice.—0.5 c.c. of an emulsion of bone marrow from the dead turkey was inoculated into each of two mice, one subcutaneously and the other intraperitoneally. Death occurred within 24 hours.

A 24-hour agar culture was fatal to mice within 24 hours when given intravenously, subcutaneously and intraperitoneally. The same culture proved fatal to mice within 48 hours when given per os and within 72 hours when given per nasum, these mice developing a marked conjunctivitis associated with a purulent discharge.

Bi-polar organisms were recovered from the heart blood in all these cases.

Guinea pig.—An abscess was produced at the site of inoculation by the subcutaneous injection of 0.2 c.c. of heart blood from a mouse dead from one of the preceding experiments.

Fowl.—0.2 c.c. of heart blood from the same mouse was inoculated into the pectoral muscles of a hen, the bird dying within 48 hours after showing symptoms considered characteristic of fowl cholera. Diarrhœa was marked, the fæces being yellowish-green in colour. The bird sat huddled and dejected and did not resist handling. Post-mortem examination showed local necrosis and hæmorrhages at the site of injection. Internally the only significant feature was the presence of hæmorrhages on the epicardium over the left ventricle. The organism was recovered in pure culture from the bone marrow, heart blood, spleen and liver.

Increase in virulence.—An attempt to increase the virulence of the organism was made by the serial passage of heart blood by the subcutaneous route through mice. After the two passages mice died in 16 hours as compared with 24 hours in the original inoculation of culture, but no further reduction occurred after three more passages.

Discussion

There is every reason to conclude that the organism isolated and considered responsible for the death of this turkey poult was *Pasteurella aviseptica,* to which organism it conformed in cultural characteristics and in its pathogenicity. The incidence of acute pasteurellosis of poultry in this country appears to have been relatively low in recent years, and where it has occurred losses in flocks have been heavy. The occurrence of this disease in the turkey has received little attention as judged by the literature on the subject. The present case is, therefore, of more than passing interest, in that, firstly, it confirms the patho-

XUM

genicity of *Pasteurella aviseptica* for the turkey, and, secondly, indicates that the organism may, on occasion, be responsible for acute but isolated deaths.

Further points of interest also arise. It seems almost incredible that an organism sufficiently virulent to cause sudden death in the turkey poult should not have been responsible for multiple deaths and more especially amongst the (presumably) more susceptible fowl. The question also arises as to the origin of infection. The turkeys were enclosed at night in a shed, the door of which was made of mesh. The view of the farmer was that a cold east wind blowing directly through the grating on to the roosting birds was responsible for the death. If this was indeed the case, it would support the view that *Pasteurella aviseptica* may on occasion live a saphrophytic existence in poultry and that some factor lowering the resistance of the bird allows the organism to become pathogenic. Contrariwise, there may be carriers of this organism, although such a view is difficult to accept in this case, as is the suggestion that infection may have been introduced by wild birds, for if this was so, then multiple deaths might have been expected.

The carcase in this case showed few diagnostic lesions on post-mortem and it is therefore of importance that those engaged on post-mortem work should consider the possibility of *Pasteurella aviseptica* infection in cases of isolated deaths in poultry.

Summary

(1) A case of pasteurellosis in a turkey poult is described.
(2) The cultural and biochemical reactions of this organism conform to those of *Pasteurella aviseptica.*
(3) The organism was pathogenic for mice and the fowl and produced local abscess formation in the guinea pig.
(4) The organism did not produce filterable hæmolysin or exotoxin in 24-hour culture.
(5) Some slight increase in virulence for mice is recorded after serial passage of heart blood subcutaneously.
(6) The origin of the infection is discussed.

Abstracts

TRC 136
December 28, 1943.

MEDICAL RESEARCH COUNCIL WAR MEMORANDUM NO. 3—ECONOMY IN THE USE OF DRUGS IN WAR TIME

A REVISED edition of this Memorandum by the Council's Therapeutic Requirements Committee is in preparation and will be published shortly. The principal changes and additions proposed are now published for comment.

The classification followed is the same as that adopted in the Memorandum :—

A = Drugs which are at present either

(1) regarded as essential,

XUM

(2) readily available.

B = Drugs which are essential for certain purposes, but not for others, and in the use of which strict economy should be observed.

C = Drugs which are not essential and do not justify importation or manufacture for home use in war time.

* indicates that an entry in War Memorandum No. 3 or in the First Supplement has been changed. The other entries are additional.

Drug	*Classification*	*Substitute or Equivalent and Remarks*
Acetomenaphthone	A	
*Acidum Acetylsalicylicum ...	B	Strict economy is essential—raw materials are in short supply.
Acidum Ricinoleicum	B	For Liquor Chloroxylenolis.
*Acidum Salicylicum	A	
Acidum Tribromoæthylicum ...	A	
*Alcohol	B	Economy is essential—many tinctures could be replaced by concentrated preparations. The use of pharmacopœial concentrated tinctures or liquid extracts diluted with water in place of alcoholic tinctures is authorised by a Scarce Substances Order, S.R. & O. 1942, No. 709.
*Alumen	A	*Delete* "use Ammonium alum only."
*Aluminii Acetas	A	*Delete* "Not to be made from Potassium alum."
*Aluminii Hydroxidum	A	*Delete* "Not to be made from Potassium alum."
Amyleni Hydras	A	
Androsterone	B	
Arsphenoxide (Mapharside) ...	A	
Biliselectan	—	Pheniodol is identical.
Bismuthi Subgallas	B	Reserve for local application.
*Borax	B	*Delete* "In dermatological practice reserve for Unguentum Aquosum."
Brilliant Green	A	
*Buchu	C	*Delete* "Importation is unnecessary."
Calcii Phosphas	A	
*Calumba	C	*Delete* "Production within the Empire should be encouraged."
*Cassia	C	Country of origin—*delete* "China," *insert* "India."
*Cinchona	B	*Add* "Reserved for use as an antimalarial drug." Under Government control, S.R. & O. 1942, Nos. 1604, 2668.
*Codeina	B	
Crystal Violet	A	
*Desoxycorticosterone Acetate ...	B	Reserve for Addison's Disease.
Dienœstrol	C	
Eschatin	B	

XUM

Drug	*Classification*	*Substitute or Equivalent and Remarks*
Ethinylandrostenediol	C	
Ethisterone	A	
Eucalyptol	B	
Hexœstrol	A	
*Insulinum	A	The stronger concentrations are more economical of materials.
Ipomea	B	
*Kino	B	
*Krameria	B	
Lethane	A	Lethane 384 Special, for Medicated (Lethane) Hair Oil, N.W.F.
Liquor Ethylis Nitritis Concentratus	A	
Liquor Hamamelidis	C	
*Lobelia	B	*Delete* " Substitute : Stramonium."
*Lobelina	B	
Lonchocarpus	A	
*Menthol	B	
Methylandrostenediol	C	
Methyltestosterone	A	
*Mepacrinæ Hydrochloridum ...	B	Reserved for use as an antimalarial drug. Under Government control, S.R. & O. 1942, Nos. 1604, 2668.
*Mepacrinæ Methanosulphonas ...	B	Reserved for use as an antimalarial drug. Under Government control, S.R. & O. 1942, Nos. 1604, 2668.
*Oleum Anethi	B	
*Oleum Anisi	B	
*Oleum Cadinum	B	
*Oleum Camphoræ Rectificatum ...	B	
*Oleum Cardamomi	B	*Delete* " Unnecessary."
*Oleum Cari	B	
*Oleum Caryophylli	B	
*Oleum Cinnamomi	B	
*Oleum Hydnocarpi	B	
*Oleum Limonis	B	
*Oleum Menthæ Piperitæ ...	B	
*Oleum Morrhuæ	B	Delete the reference to substitutes.
*Oleum Terebinthinæ	B	
*Oleum Vitaminatum	B	
*Pamaquinum	B	Reserved for use as an antimalarial drug. Under Government control, S.R. & O. 1942, Nos. 1604, 2668.
Papaveretum	A	
Papaverine and its salts	A	
Pentamidine	A	
Pentothal Sodium	A	
Pethidine Hydrochloride ...	A	
*Phenol	A	
Pheniodol	A	
Phenylhydrargyri Nitras ...	B	

Drug	*Classification*	*Substitute or Equivalent and Remarks*
Phenylhydrargyri Acetas ...	B	
Picrotoxinum	A	
*Potassa Sulphurata	A	
*Potassii Bicarbonas	A	
*Potassii Bromidum	A	
*Potassii Chloras	B	*Delete* " Not essential."
*Potassii Citras	B	See under Acidum Citricum.
*Potassii Hydroxidum	A	
*Potassii Iodidum	A	
*Potassii Nitras	A	
*Potassii Permanganas	B	
Propamidine	A	
Prostigmine	A	
Pyrethrum	B	
*Quinidinæ Sulphas	B	Reserved for the treatment of cardiac arrhythmia. Under Government control, S.R. & O. 1942, Nos. 1604, 2668.
*Quinine Salts	B	Reserved for use as antimalarial drugs. Under Government control, S.R. & O. 1942, Nos. 1604, 2668.
Riboflavine	B	Not to be used in compound preparations.
*Scammonii Resina	B	
*Sodii Diphenylhydantoinas ...	A	Phenytoinum Solubile is identical.
Sodii Metabisulphis	A	
Sodii Morrhuas	A	
Sodii Perboras	B	
*Sodii Salicylas	A	
*Sodii Tauroglycocholas	B	*Delete* " Substitute : Extract of ox bile."
Stilbamidine	A	
*Strophanthus	B	*Delete* " Countries of origin : Mozambique, Nyasaland. Importation unnecessary. Substitute : Digitalis."
Succinylsylphathiazole	B	Supplies are limited.
Sulphamezathine	B	Supplies are limited.
Sulphasuxidine	—	Succinylsulphathiazole is identical.
Syrupus Ferri Phosphatis cum Strychnina	C	Substitute Tablets of Easton's Syrup.
*Talcum Purificatum	B	*Delete* " Raw materials imported. For substitutes see under Acidum Boricum."
Terpineol	A	
Testosterone	A	
Testosterone Propionate	A	
Theophylline Sodium Acetate ...	A	
Thiouracil	A	
Thymol	B	
*Totaquina	B	Reserved for use as an antimalarial drug. Under Government con-

Drug	*Classification*	*Substitute or Equivalent and Remarks*
		trol, S.R. & O. 1942, Nos. 1604, 2668.
Toxinum Staphylococcicum Detoxicatum	A	
*Tragacantha	A	*Delete* "Methyl cellulose and similar synthetics may be tried as substitutes."
Urethanum	B	
Vitamin E	C	
Wool Alcohols	A	
Zinc Peroxide	B	

Obituary

W. W. C. TOPLEY, M.D., F.R.C.P., F.R.S.

It is our sad duty to record the sudden death of Dr. W. W. C. Topley, which occurred on January 21. We, as a profession, have lost an able champion; some of us have lost a sincere friend. Dr. Topley was associated with us in our work over a long period, for his interests lay largely in a study of epidemics. He will be remembered by his former pupils who studied for the Diploma in Bacteriology at the London School of Hygiene and Tropical Medicine and by many members of the veterinary profession for the standard text-books used by them in their student and professional days—"An Outline of Immunity" and "The Principles of Bacteriology and Immunity" (written with Professor G. S. Wilson). To those he will remain as a man who contributed to their careers. Some of us, however, came into close contact with him in his work as secretary of the Agricultural Research Council. In Dr. Topley we had a scientist with vision: he realised the problems we had to tackle and he knew from his vast experience and knowledge the best lines on which they should be studied. He brought to our problems new angles of attack, the basis of which were fundamentally and scientifically sound. His method of working out a problem included the making use of the knowledge of all who could assist, although at first sight in some respects it might have been difficult to foresee how such knowledge could be applied. Time will show that his methods were sound.

Much could be written on Dr. Topley's ability, his work and his great interest in the health and diseases of livestock. These subjects have been dealt with in full in other scientific journals and periodicals. We as a profession are the poorer by his death; his friends will have much difficulty in finding someone to replace him in their lives. It will be our endeavour, however, to continue on the lines on which he led us.

CORRIGENDA

Owing to the proof not reaching the printers in time for the necessary alterations to be made, two mistakes occurred in the short article on "Follicular Mange," by Mr. C. Wentworth Elam, which appears on page 17 of our January issue. The therapeutic agent referred to should, of course, have been Succus allii and not Saccus alii. Also the closing sentence should read: "perhaps our research workers could inform us," etc. (not research *masters*).

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